

TAXONOMY AND NOMENCLATURE OF
STRYMON ISTAPA AND *S. COLUMELLA* (LYCAENIDAE:
THECLINAE: EUMAEINI)

ROBERT K. ROBBINS

Department of Entomology, National Museum of Natural History
Smithsonian Institution, Washington, DC 20560-0127, USA

AND

STANLEY S. NICOLAY

1500 Wakefield Drive, Virginia Beach, Virginia 23455, USA

ABSTRACT. *Strymon istapa* has been considered a junior synonym of *S. columella*, but its female genitalia distinguish it from all other *Strymon*, including *S. columella*, and it is uncertain which *Strymon* species is most closely related to *S. istapa*. *Strymon istapa* ranges from the southern United States to Perú and Brazil, but is allopatric with *S. columella*, which is restricted to the Antillean islands from Vieques and Palominos to Antigua. The poorly-known South American range of *S. istapa* is documented, and geographical variation of its genitalia is illustrated. The nomenclature is summarized in a synonymic list, including the recognition of *S. columella* and *S. istapa* as distinct species, a **NEW STATUS**.

Additional key words: Antilles, genitalia, brush organs.

Even though the species widely called *Strymon columella* F. (Clench 1961, 1964, Howe 1975, Opler & Krizek 1984, Scott 1986) is a well-known, oftentimes common species that occurs from California, Arizona, Texas, and Florida south into Latin America, its identity has been unsettled for two centuries. Fabricius (1793) named *Hesperia columella* (this genus now belongs to the Hesperiiidae) from "Americae meridionalis Insulis" with a verbal description that did not adequately distinguish the species. Few authors over the next 150 years agreed on the identity of this species and its relatives. Comstock and Huntington (1943) summarized this discordant history and attempted to correct the taxonomy of the *Thecla columella* group (*Thecla* F. was the genus then in use for most Neotropical Theclinae).

Because Comstock and Huntington apparently did not know that a type of *T. columella* was extant in Copenhagen's Zoological Museum (Aurivillius 1898), they mistakenly recognized *T. columella* as the widespread species mentioned above and named a related new species (*T. antigua*) from Antigua and nearby islands. After Ziegler (1960) and Clench (1961) transferred *T. columella* and related species to *Strymon*, Riley (1975) and Smith et al. (1994) synonymized *S. columella* and *S. antigua* and noted that they refer to the same subspecies. As Comstock and Huntington remarked, the taxonomic history of *S. columella* is "slightly confusing."

As part of a study of the genus *Strymon*, we have examined the morphology of species in the *Strymon columella* group from the Antilles (Comstock & Huntington 1943, Smith et al. 1994), specifically *S. columella*, *S. toussainti* Comstock & Huntington (a senior synonym of *S. andrewi* Johnson & Matusik and *S. amonensis* Smith et al., Robbins & Nicolay 1999), *S. limenia* Hew., *S. bubastus* Stoll, *S. istapa* Reakirt, and *S. christophei* Comstock & Huntington. This paper (1) shows that *S. columella* (= *S. antiqua*) is not conspecific with *S. istapa* (the widespread "*S. columella*" that occurs from Florida to California and to South America); (2) illustrates the wing pattern and genitalia of *S. columella* and *S. istapa*; (3) documents geographical variation in the genitalia of *S. istapa*; (4) illustrates the poorly-known South American distribution of *S. istapa*; and (5) summarizes the nomenclature of these two species.

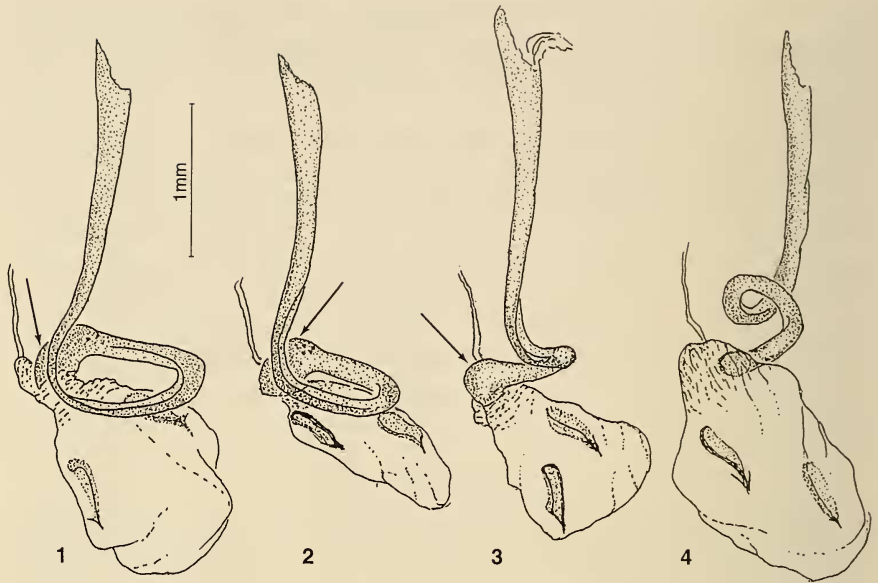
MATERIAL EXAMINED

Museum collections that contained specimens used in this study are: AMNH, American Museum of Natural History, New York, USA; AME, Allyn Museum of Entomology, Florida Museum of Natural History, Sarasota, Florida, USA; BMNH, The Natural History Museum, London, UK; CMNH, Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA; INPA, Coleção Entomológica do Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brazil; MCZ, Museum of Comparative Zoology, Cambridge, Massachusetts, USA; UFPR, Universidade Federal do Paraná, Curitiba, Paraná, Brazil; UNAM-IB, Instituto de Biología, UNAM, Mexico City, Mexico; USNM, National Museum of Natural History, Washington, DC, USA.

RESULTS

Female genitalia. Female genitalia distinguish *S. istapa* from all other eumaeines. The anterior ductus bursae forms an enlarged bell-like chamber (arrows in Figs. 1–3), which appears to be unique within the Eumaeini. *Strymon columella* (Fig. 4) and the other members of the Antillean *S. columella* group lack the enlarged chamber (see also illustrations in Robbins & Nicolay 1998).

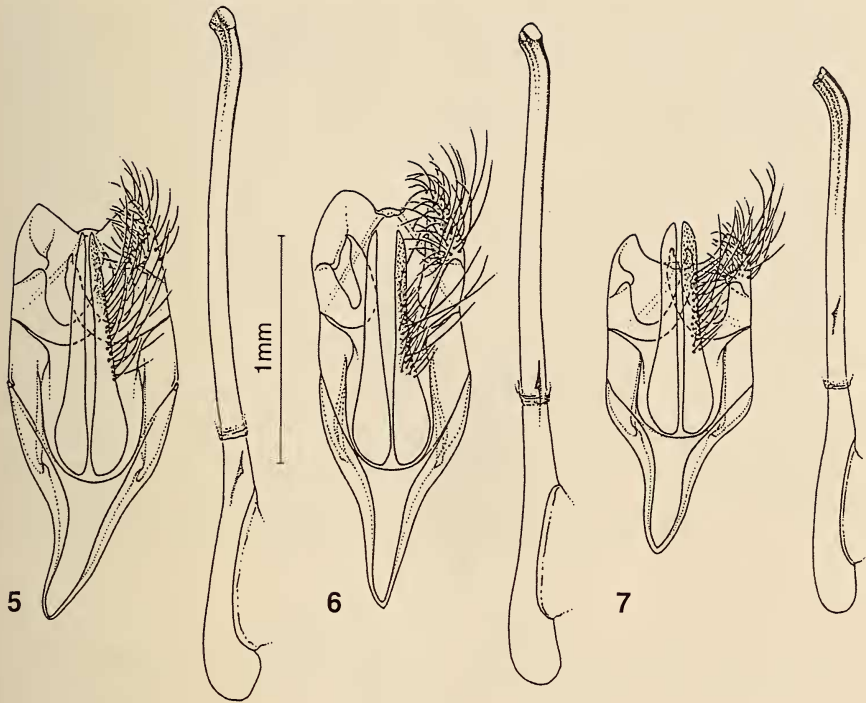
The female genitalia of *S. istapa* vary geographically. The length of the ductus bursae, including extent of the "loop," is greatest in the Antilles and southern United States and is progressively smaller to the south on the mainland (Figs. 1–3). Additionally, the exact shape of the loop in the ductus bursae varies, sometimes greatly, among individuals from any one locality, but the anterior ductus bursae with an enlarged bell-like chamber is consistent throughout its extensive range.



FIGS. 1-3. Bursa copulatrix of *S. istapa* in lateral left aspect showing geographical variation in size. 1. Mexico; 2. Panamá; and 3. Maranhão, Brazil. Arrows point to enlarged chamber at anterior end of the ductus bursae. FIG. 4. Bursa copulatrix of *S. columella* (from Vieques) in lateral aspect, with anterior ductus bursae lacking an enlarged bell-like chamber.

Two other female genitalic structures in the Antillean *S. columella* complex provide evidence on the relationship between *S. istapa* and *S. columella*. In *S. columella*, *S. limenia*, and *S. christophei* the "loop" of the ductus bursae is dorsal of the ductus bursae (Fig. 4) while it is ventral (Figs. 1-3) in *S. istapa*, *S. toussainti*, and *S. bubastus*. In *S. limenia*, *S. bubastus*, and *S. toussainti* the posterior tip of the corpus bursae is sclerotized and the ductus seminalis arises anterior of this sclerotized tip (illustrated in Smith et al. 1991, Robbins & Nicolay 1999). In *S. istapa* (Figs. 1-3), *S. columella* (Fig. 4), and *S. christophei*, the posterior tip of the corpus bursae is not sclerotized.

Male genitalia. Geographical variation of the male genitalia in *S. istapa* (Figs. 5-7) is analogous to that of the female genitalia. The male genitalia are largest in the Antilles and southern United States and are progressively smaller to the south on the mainland. Otherwise, the male genitalia of *S. istapa*, *S. toussainti*, *S. limenia*, and *S. columella* are barely distinguishable. Those of *S. toussainti* and *S. limenia* are similar in size to those of *S. istapa* at the southern end of its range while those of *S. columella* are similar in size to those at the northern end (Fig. 8).



FIGS. 5-7. Male genitalia of *S. istapa* in ventral aspect and its aedeagus in lateral aspect showing geographical variation in size. 5, Mexico; 6, Panamá; and 7, Meta, Colombia.

The male genitalia of *S. bubastus* and *S. christophei* differ from those in the remainder of the *S. columella* group. The dorsal part of the labides of *S. bubastus* are more rounded and posteriorly produced than those of the other species. The holotype male of *S. christophei*, which is the only male of this species that was available for study, has a wider cornutus than *S. istapa*.

Male *Strymon* have brush organs (*sensu* Eliot 1973) above the vinculum and attached to the intersegmental membrane between the 8th abdominal segment and the vinculum. However, the brush organs may be very small in some individuals of *S. bubastus*. Of 18 male *S. istapa* from Florida and the Antilles, 5 had small brush organs and 13 had none. Individuals with and without brush organs occur in Florida, the Cayman Islands, Cuba, and Puerto Rico, and we believe that this is the first report of an eumaeine dimorphic for the presence of brush organs. All individuals of *S. istapa* from other areas had brush organs.

Wing pattern. The ventral forewing postmedian line, which consists of a series of spots from veins R2 to Cu2, is a good character for distin-

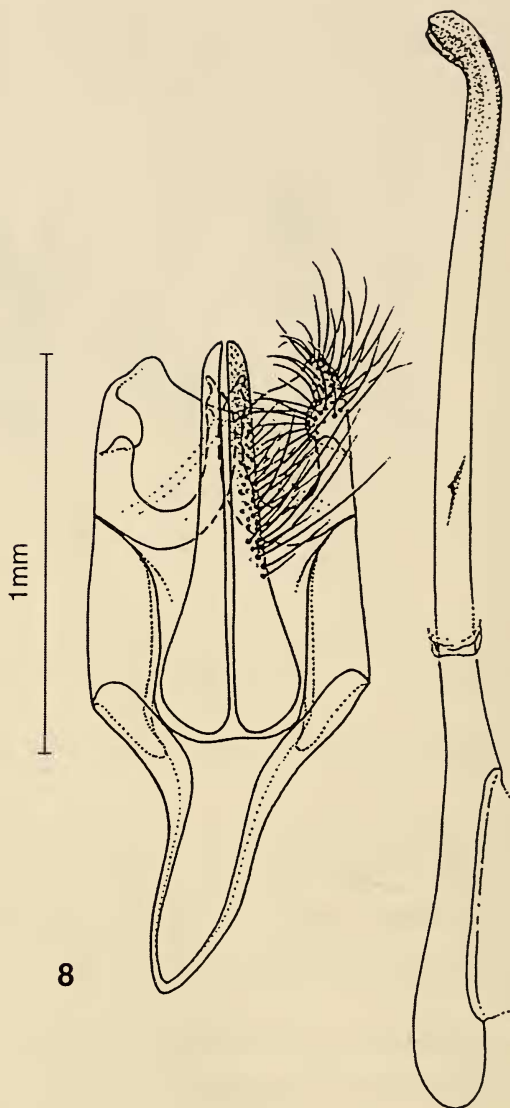


FIG. 8. Male genitalia of *S. columella* (from Vieques) in ventral aspect and its aedeagus in lateral aspect.

guishing taxa in the Antillean *S. columella* group (Comstock & Huntington 1943). In *S. toussainti*, the spot in cell M1-M2, and to a lesser extent in cell M2-M3, is displaced basally more than 0.35 mm (arrow in Fig. 14) while the spots from veins R2 to M3 are essentially co-linear in others of the *S. columella* complex, with occasional minor variation in *S.*

limenia. In *S. bubastus*, the spot in cell M3-Cu1 is displaced distally (arrow in Fig. 12) while the spots from veins M3 to Cu2 are co-linear, or nearly so, in the other species of the *S. columella* complex. Finally, the spot in cell M2-M3 is displaced distally more than 0.5 mm in *S. christophei* (arrow in Fig. 15). These characters are well-illustrated in Smith et al. (1994).

The ventral hindwing pattern also has useful distinguishing characters in the *S. columella* complex (Figs. 9-15). The postmedian line of *S. columella* is co-linear from the costa to vein Cu2 (arrow and circle in Fig. 11), unlike the others in which the spots in cells M1-M2 and M2-M3 are displaced distally. *Strymon christophei* is unique in lacking basal spots. Finally, the ventral hindwing patterns of *S. istapa* and *S. bubastus* are exceedingly similar (Figs. 9, 12).

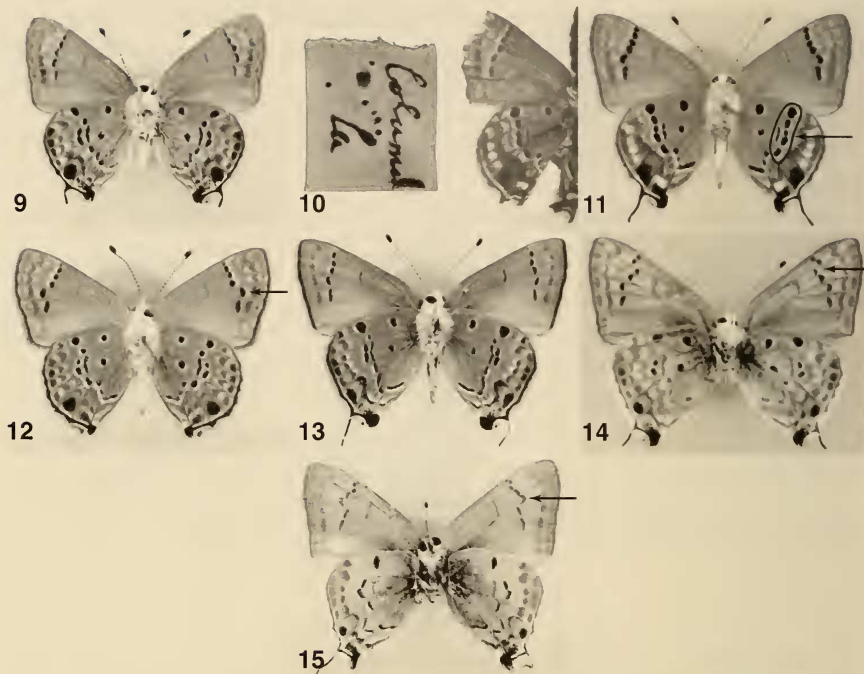
While *S. columella*, *S. istapa*, *S. toussainti*, *S. limenia*, and *S. christophei* have a hindwing tail, *S. bubastus* lacks one throughout its extensive range except for a small tail on one Bolivian male, whose wing pattern and genitalia identify it as *S. bubastus* (Figs. 9-15).

DISCUSSION

Taxonomy. *Strymon istapa* and *S. columella* are distinct species, as noted originally by Comstock and Huntington (1943), on the basis of their female genitalia and wing pattern. The female genitalia of *S. istapa*, with the enlarged chamber at the anterior end of the ductus bursae, differ from those of all other members of the *S. columella* complex. The straight ventral hindwing postmedian line of *S. columella* differs from that of all other species in the *S. columella* complex.

It is unclear whether *S. istapa* and *S. columella* are closest relatives. The "ventral loop" of the ductus bursae in *S. istapa* is shared with *S. bubastus* and *S. toussainti*, but not with *S. columella*. The lack of a sclerotized posterior tip of the corpus bursae in *S. istapa* is shared with *S. columella* and *S. christophei*. The ventral hindwing pattern of *S. istapa* is most similar to that of *S. bubastus*. The male genitalia of *S. istapa* are quite similar to those of *S. limenia*, *S. toussainti*, and *S. columella*. Although phylogenetic analysis might resolve relationships, we are as yet unsure whether the Antillean *S. columella* complex is monophyletic.

We found no convincing evidence in the variation of the genitalia or wing pattern that more than one species is represented within the wide distribution of *S. istapa*. Geographical variation in size of the male and female genitalia appears to be clinal. Differences in wing pattern on islands are slight. Although the male genitalic brush organs are small or absent in specimens from Florida and the Antilles, similar variation (but of smaller magnitude) also occurs in *S. bubastus*.



FIGS. 9–15. Ventral wings of the Antillean *S. columella* complex. 9, *S. istapa*; 10, Syntype of *S. columella* (courtesy of F. M. Brown); 11, *S. columella*; 12, *S. bubastus*; 13, *S. liemenia*; 14, holotype of *S. toussainti*; and 15, holotype of *S. christopheï*. Arrows point to characters discussed in the text.

Habitat and range. As characterized, *S. istapa* is a denizen of disturbed, usually xeric, habitats in Florida, the Antilles, and the United States (California) south to Brazil (Maranhão) and Perú (San Martín) on the mainland. *Strymon columella*, on the other hand, is restricted to the Antilles from Vieques and Palominos to Antigua (Smith et al. 1994). The Antillean distributions of these species are well documented (Comstock & Huntington 1943, Riley 1975, Smith et al. 1994). They are allopatric; *S. istapa* occurs in the Greater Antilles east to Puerto Rico while *S. columella* occurs only on the islands east of Puerto Rico.

Although *S. istapa* is often a very common species in the Antilles and Central America, it is rare and poorly documented in South America. For example, Clench (1961) did not record it from South America, and the recent Bolivian record (Smith et al. 1994) is probably based on the one tailed individual of *S. bubastus*. The confirmed South American distribution of *S. istapa* (Fig. 16) includes the provinces of Meta (Colombia, specimens in USNM), Nueva Esparta (Venezuela, specimen in



FIG. 16. South American distribution of *S. istapa*.

USNM), Bolivar (Venezuela, specimen in MCZ), San Martín (Perú, specimen in USNM), Roraima (Brazil, specimen in INPA), and Maranhão (Brazil, specimens in UFPR).

Nomenclature. The nomenclature of *S. columella* is straightforward. The type of *S. columella* (F.) in Copenhagen (Fig. 10) is the same species as *S. antiqua* (type in AMNH), as previously noted (Smith et al. 1994). The name *S. erytalus* Butler originally appeared as a synonym of *S. columella*, and was a reference to a manuscript name (Barnes & Benjamin 1926). Comstock and Huntington (1943) synonymized it with *S. columella*.

The nomenclature of *S. istapa* is also uncomplicated. No type of *S. istapa* (Reakirt) is known (Miller & Brown 1981), but the original description of a female from Mexico, with two dark brown basal spots on the ventral hindwings, could refer to no other Mexican species. The identity of this name has been consistent for over a century (Scudder 1889), even if the taxonomy has been confused. Similarly, types of *S. modesta* (Maynard) and *S. ocellifera* (Grote) are unknown (Miller & Brown 1981), but their identities have been consistent since Scudder (1889). We have seen types of *S. cybira* (Hewitson) (in BMNH), *S. arecibo* (C. & H.) (in AMNH), and *S. clarionica* (Vázquez) and *S. socorroica* (Vázquez) (in UNAM-IB), and all represent the same biological species that we recognize as *S. istapa*.

The following synonymic list summarizes these results.

- Strymon columella* (Fabricius, 1793)
 = *Tmolus erytalus* Butler, [1870]
 = *Thecla antiqua* Comstock & Huntington, 1943
Strymon istapa (Reakirt, [1867]) **REINSTATED STATUS**
 = *Lycaena modesta* Maynard, 1873
 = *Callicista ocellifera* Grote, 1873
 = *Thecla cybira* Hewitson, 1874
 = *Thecla arecibo* Comstock & Huntington, 1943
 = *Thecla clarionica* Vázquez, 1958
 = *Thecla socorroica* Vázquez, 1958

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